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RESEARCH NOTE

Confirmed absence of a relict population of *Gonidea angulata* (Lea, 1838) (Mollusca: Bivalvia: Unionidae) in Colorado

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Abstract: The diversity of freshwater mussels in Colorado is low compared to other regions of the U.S.A., with only three extant species (down from seven a century ago). The western ridged mussel (*Gonidea angulata*) occurs in Pacific Coast drainages from British Columbia to California and eastward to Idaho and Nevada. It has been reported from Colorado based on a single museum specimen from Clear Lake, representing a significant range expansion for this species. During extensive recent surveys, I was unable to pinpoint this locality and regarded it as questionable. Examination of the specimen and locality data indicated this specimen was collected from Clear Lake, Lake County, California.

Key words: freshwater mussels, Unionidae, Colorado, distribution, range

Studies of freshwater mussels in the Rocky Mountain region are rare compared to other regions of North America. Historical surveys were conducted by Cockerell (1889, 1927), Ellis (1916), Ellis and Keim (1918), and Henderson (1907a, 1907b, 1912, 1924). More recent surveys include Brandauer and Wu (1978), Herrmann and Fajt (1985), and Wu (1989).

Gonidea angulata (Lea, 1838) is a freshwater mussel (family Unionidae) belonging to a monotypic genus confined to Pacific drainages of northwestern North America (Graf 2002). Its historical range extended from southern British Columbia to southern California and eastward to Idaho and Nevada with extant populations in southwest Washington, northwest Oregon, continuously from southwest Oregon south to southern California, as well as interior Washington and Oregon, southern Idaho, and northern Nevada (Ingram 1948, Taylor 1981, COSEWIC 2003, NatureServe 2004).

I published a distributional guide to the few remaining freshwater mussels in Colorado (Cordeiro 1999) as well as some short notations on distribution of freshwater bivalves in the state (Cordeiro 1998, Cordeiro and MacWilliams 1999). Distributional data included records from museum collections, published and unpublished literature, and field surveys. Prior surveys revealed six species in the state: *Anodontoides ferussacianus* (Lea, 1834), *Lampsilis siliquoidea* (Barnes, 1823), *Lampsilis teres* (Rafinesque, 1820), *Pyganodon grandis* (Say, 1829), *Strophitus undulatus* (Say, 1817), and *Uniomerus tetralasmus* (Say, 1831). A seventh species, *Lampsilis ventricosa* (Barnes, 1823) was cited by Henderson (1907a) for Lodgepole Creek in the northwest corner of the state but this species has been synonymized under both *Lampsilis ovata* (Say, 1817) and *Lampsilis cardium* Rafinesque, 1820. Presently, only *A. ferussacianus*, *P. grandis*, and *U. tetralasmus* are extant in Colorado (Cordeiro 1999). Additionally, I cited an unconfirmed record of *Gonidea angulata* (Lea, 1838), based on a single specimen in the Florida Museum of Natural History (FLMNH 65292) collected from "Clear Lake, Colorado." I was unable to survey Clear Lake due to time, distance, and some confusion over its exact location. There are three different Clear Lakes in Colorado: in Delta and Gunnison Counties (Colorado River Basin), as well as in San Juan County (San Juan River Basin). None are even remotely close to any current or historical occurrences of freshwater mussels in Colorado nor are they within any Pacific drainages where *G. angulata* is typically found. Surveys in western Colorado for freshwater molluscs (including mussels) in 2003 (Sovell and Guralnick 2004) and 2004 (J. Sovell, pers. comm.) have failed to find this or any other species of freshwater mussel.

Other recent surveys have detected *Gonidea angulata* in the Humboldt River drainage (Lahonta Basin) in northern Nevada (Hovingh 2004). Smaller individuals found downstream in Carlin (Hovingh 2004) indicate this population may be increasing and may have been overlooked in previous surveys as this area historically contained only *Anodonta californiensis* Lea, 1852, in 1912 and 1939 (Walker 1916, Jones 1940). Despite early reports by Henderson (1924, 1929, 1936) for Utah and Montana, more recent surveys in these states have failed to find any individuals of *G. angulata*

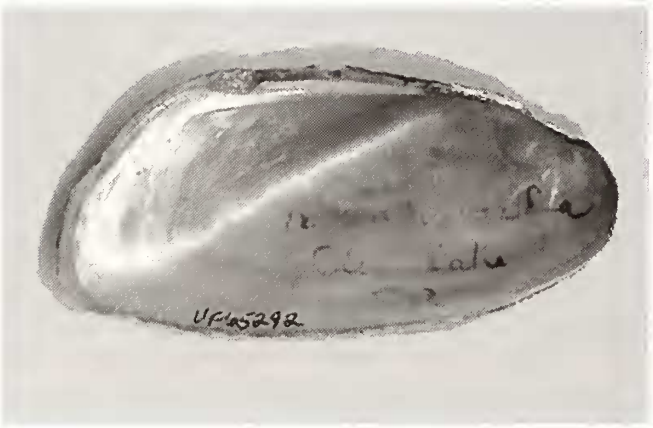

Figure 1. Florida Museum of Natural History specimen lot FLMNH 65292 of *Gonidea angulata* (shell length approximately 70 mm). Photo by John Slapcinscky, FLMNH.

(Chamberlin and Jones 1929, Jones 1940, Oliver and Bosworth 1999, Gangloff and Gustafson 2000, Lippincott and Davis 2000).

Clear Lake, occupying several towns in Lake County, California, is the state's second largest freshwater lake and is likely the proper locality for the FLMNH specimen lot of *Gonidea angulata*. The presence of *G. angulata* in Clear Lake is documented by Taylor (1981: 143) and by museum specimens from the Florida Museum of Natural History (FLMNH 4234) and United States National Museum (USNM 26094). Examination of FLMNH 65292 (Fig. 1) revealed writing on the interior left valve, "*N. angulata* Clear Lake Cal", with the "a" not quite making a complete circle and having a very short tail. The specimen was collected by C. Mohr, who deposited other specimens in the Florida Museum of Natural History from California (Monterey, Purissima, San Diego, San Francisco, and Tomales Bay) but not from Colorado (J. Slapcinsky, pers. comm.). This confirms the locality as Clear Lake, California, and not Clear Lake, Colorado.

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